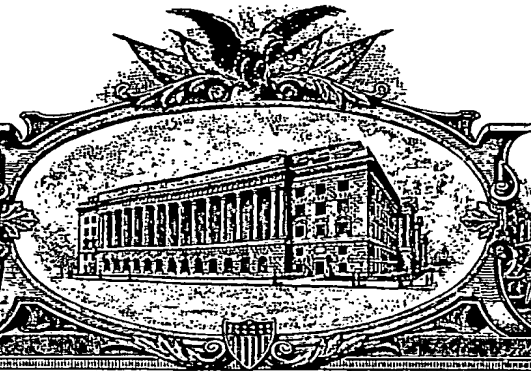


IB/04/03027

REC'D 10 MAR 2005

WIPO

PA 1287189



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:  
UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

February 25, 2005

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM  
THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK  
OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT  
APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A  
FILING DATE UNDER 35 USC 111.

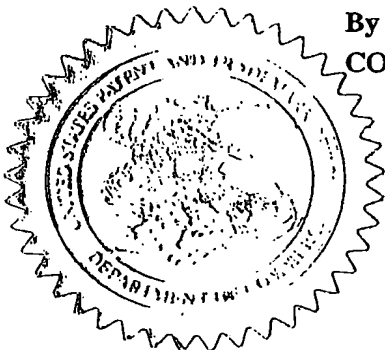
APPLICATION NUMBER: 60/503,921 ✓

FILING DATE: September 19, 2003 ✓

## PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)

By Authority of the  
COMMISSIONER OF PATENTS AND TRADEMARKS



*N. Williams*  
N. WILLIAMS

Certifying Officer

## PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

EV227730128US

INVENTOR(S)					
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)			
Douglas Stanley	Lightening	Benoni, South Africa			
Chris	Kok	Ballito, South Africa			
Christoffel Johannes	Kok	Ballito, South Africa			
<input type="checkbox"/> Additional Inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
DELINTING OF COTTON SEED					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input checked="" type="checkbox"/> Customer Number		27879		Place Customer Number Bar Code Label here	
OR					
<input type="checkbox"/> Firm or Individual Name					
Address					
Address					
City		State		ZIP	
Country		Telephone		Fax	
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages		3		<input type="checkbox"/> CD(s), Number	
<input type="checkbox"/> Drawing(s) Number of Sheets				<input type="checkbox"/> Other (specify)	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)	
<input checked="" type="checkbox"/> A check or money order is enclosed to cover the filing fees					
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number:				23-1925	
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.				\$80.00	
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME Lawrence A. Steward

TELEPHONE 317-636-0886

Date

9/19/2003

REGISTRATION NO.  
(if appropriate)  
Docket Number:

32,309

10690/002

### USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

-1-

## **DELINTING OF COTTON SEED**

### **BACKGROUND OF THE INVENTION**

THIS invention relates to a method for delinting cotton seed.

After it has been picked, cotton bale is removed from the cotton seed mechanically. After the mechanical removal, the seeds are still covered with cotton lint. Seeds covered with cotton lint are referred to as "fuzzy seed".

In order to plant the seed, the lint must be removed from the seed to provide "black seed".

Currently, lint is removed from cotton seed using an acid such as  $H_2SO_4$  or  $HCl$ . The problem with this method is that the acid is corrosive and not environmentally friendly.

It is an object of this invention to provide an alternative method for delinting of cotton seed.

-2-

**SUMMARY OF THE INVENTION**

According to the invention there is provided a method of delinting cotton seed, the method including the step of mixing the cotton seed with abrasive particles. The mixing preferably involves bringing the cotton seed and abrasive particles into high-speed contact.

Typically, the abrasive particles have a mean diameter of from 0.1 mm to 2 mm.

The abrasive particles could be calcium carbonate, glass, diatomaceous earth, sugar and/or sand, preferably sea sand or river sand.

In a second step of the invention, any lint remaining on the seeds after the first step may be removed by chemical action, for example by way of an acid, polymer or an enzyme.

**DESCRIPTION OF PREFERRED EMBODIMENTS**

According to the invention, lint is removed from "fuzzy" cotton seed by bringing the seed into high-speed contact with abrasive particles in a mixer. Typically, the abrasive particles have a mean diameter of 0.1 mm to 2 mm. Any abrasive particles such as calcium carbonate, glass, diatomaceous earth, sugar or sand, may be used. Sea sand has been found to be particularly effective, as well as cost effective.

The abrasive particles and cotton seed may be mixed in any kind of mixer. In laboratory tests, using a mechanical mixer which was run at speeds from 50 rpm to 1000 rpm, preferably 200 rpm to 1000 rpm it has been found that up to 70% to over 90% of the lint is removed from the "fuzzy" cotton seed. The mixer preferably includes an extractor which extracts lint from the mixer and traps the lint in a filter. Lint removed from the filter can be used commercially. Alternatively, the mixer may be a speed mixer with

-3-

intensifiers. The seed is in contact with the abrasive particles whilst these are kept in a state of high speed movement mechanically.

After removing the lint from the "fuzzy" seeds using the abrasive action, the delinted seeds are separated from the abrasive particles and any lint remaining may be removed using a chemical action, if necessary. This chemical action can be by way of an acid (preferably phosphoric acid), polymer and/or an enzyme (such as cellulase).

An advantage of the invention is that once the delinted cotton seeds have been separated from the abrasive particles, the abrasive particles can be re-used. Thus, the process is cost-effective. The process is also environmentally friendly because it does not make use of large amounts of acid as is done in the prior art. A further advantage is that lint removed from the seed is retained, and can be used commercially.

A non-limiting Example of the invention is provided below:

Fuzzy cotton seed and sea sand is added in a food processor mixer at a ratio of 2 parts by volume seed to 1 part by volume sand. The mixer is started and is run at about 500 rpm with extraction to remove any lint, which comes off of the seed. This lint is recovered from a filter unit and can be used commercially. The mixer can run for a cycle of 10 to 15 minutes and about 90% of the lint is removed from the seeds. Thereafter, the mixture is put through a screen, which will separate the cotton seed from the sand. The sand is then recovered and can be reused. It is optional to vary the mixing time and speed of mixing to improve lint removal.

If necessary, any lint remaining on the seeds may be removed chemically using acid and enzymes. Phosphoric acid is used to adjust the pH to 5 which is the optimum for the enzyme cellulase to remove any remaining lint.

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference PA135471/PCT	<b>FOR FURTHER ACTION</b>	See item 4 below
International application No. PCT/IB2004/003027	International filing date ( <i>day/month/year</i> ) 17 September 2004 (17.09.2004)	Priority date ( <i>day/month/year</i> ) 19 September 2003 (19.09.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant LIGHTENING, Douglas, Stanley		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).
2. This REPORT consists of a total of 4 sheets, including this cover sheet.  
  
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input type="checkbox"/>            | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 21 March 2006 (21.03.2006)
Facsimile No. +41 22 740 14 35	Authorized officer  <div style="text-align: center; font-weight: bold;">Idhir Britel</div> Telephone No. +41 22 338 70 60

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
HEATHER JUNE DONALD  
SPOOR & FISHER  
BLOCK A, ROCHESTER PLACE  
PO BOX 41312 CRAIGHALL  
GAUTENG, SOUTH AFRICA 2024

## PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference  PA 135471/PCT		Date of mailing (day/month/year) <b>03 MAY 2005</b>	
		FOR FURTHER ACTION See paragraph 2 below	
International application No.  PCT/IB04/03027	International filing date (day/month/year)  17 September 2004 (17.09.2004)	Priority date (day/month/year)  19 September 2003 (19.09.2003)	
International Patent Classification (IPC) or both national classification and IPC  IPC(7): D01B 1/04 and US Cl.: 019/40, 41; 451/032, 035, 326			
Applicant  LIGHTENING, DOUGLAS STANLEY			

1. This opinion contains indications relating to the following items:

- |                                     |              |  |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the opinion   |
| <input type="checkbox"/>            | Box No. II   | Priority   |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability   |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention   |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited  |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application   |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application  |

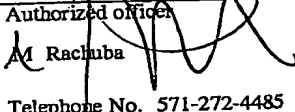
### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer  M. Rachuba Telephone No. 571-272-4485
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Form PCT/ISA/237 (cover sheet) (January 2004)

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/IB04/03027

**Box No. I Basis of this opinion**

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB04/03027

**Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims <u>5-9</u>	YES
	Claims <u>1-4, 10-13</u>	NO
Inventive step (IS)	Claims <u>7-9</u>	YES
	Claims <u>1-6, 10-13</u>	NO
Industrial applicability (IA)	Claims <u>1-13</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and explanations:**

Claim 13 lacks novelty under PCT Article 33(2) as being anticipated by Ware, 2,433,178. '178, figure 1, discloses the claimed invention, including an apparatus comprising a vessel including a cylindrical inside wall and means for introducing compressed air into the vessel tangentially relative to the inside wall.

Claims 1-3 and 10-12 lack novelty under PCT Article 33(2) as being anticipated by JP 3-160908. '908 discloses the claimed invention, see English language abstract, included herein.

Claims 1-4 lack novelty under PCT Article 33(2) as being anticipated by DE 3619952. '952 discloses the claimed invention, see English language abstract, included herein.

Claims 5 and 6 lack an inventive step under PCT Article 33(3) as being obvious over DE '952. '952 does not disclose the rotational speed of the mixing device, but does disclose that the device is "intensively agitated". It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided '952 with the claimed speed ranges, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Claims 7-9 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a mixing method wherein the mixing is done with high speed air at a pressure of between 0.5 to 2 bar.